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BIOLOGICAL EVALUATION OF SOUTHERN PINE BEETLE INFESTATIONS ON THE CHATTAHOOCHEE NATIONAL FOREST, GEORGIA

by

William H. Hoffard, Entomologist

ABSTRACT

Southern pine beetle (Dendroctonus frontalis Zimm.) activity on the Chattahoochee National Forest is low. Aerial surveys of 526,242 acres containing 255,299 acres of host type show only 0.37 infestations per 1,000 acres of host type on the three infested Districts. A high percentage of currently infested trees and heavy beetle activity to the south and east indicate an increasing need for control and close surveillance.

INTRODUCTION

In December 1979, biological evaluations were made on Districts of the Chattahoochee National Forest to determine the status of southern pine beetle infestations and possible need for suppressive measures.

Historically, southern pine beetle populations on the Chattahoochee have fluctuated dramatically. In the late 1960's, populations were moderate-low to very low. In the early 1970's, however, populations exploded, thereby necessitating a massive control program. From the mid-70's to the present, infestations have been low to moderate in intensity. A review of Forest Service records further shows the boundaries of heaviest activity are surprisingly consistent over the years, being concentrated in the eastern section of the forest along the South Carolina border (figure 1).

SOUTHEASTERN AREA, STATE & PRIVATE FORESTRY
USDA FOREST SERVICE, ATLANTA, GA 30309

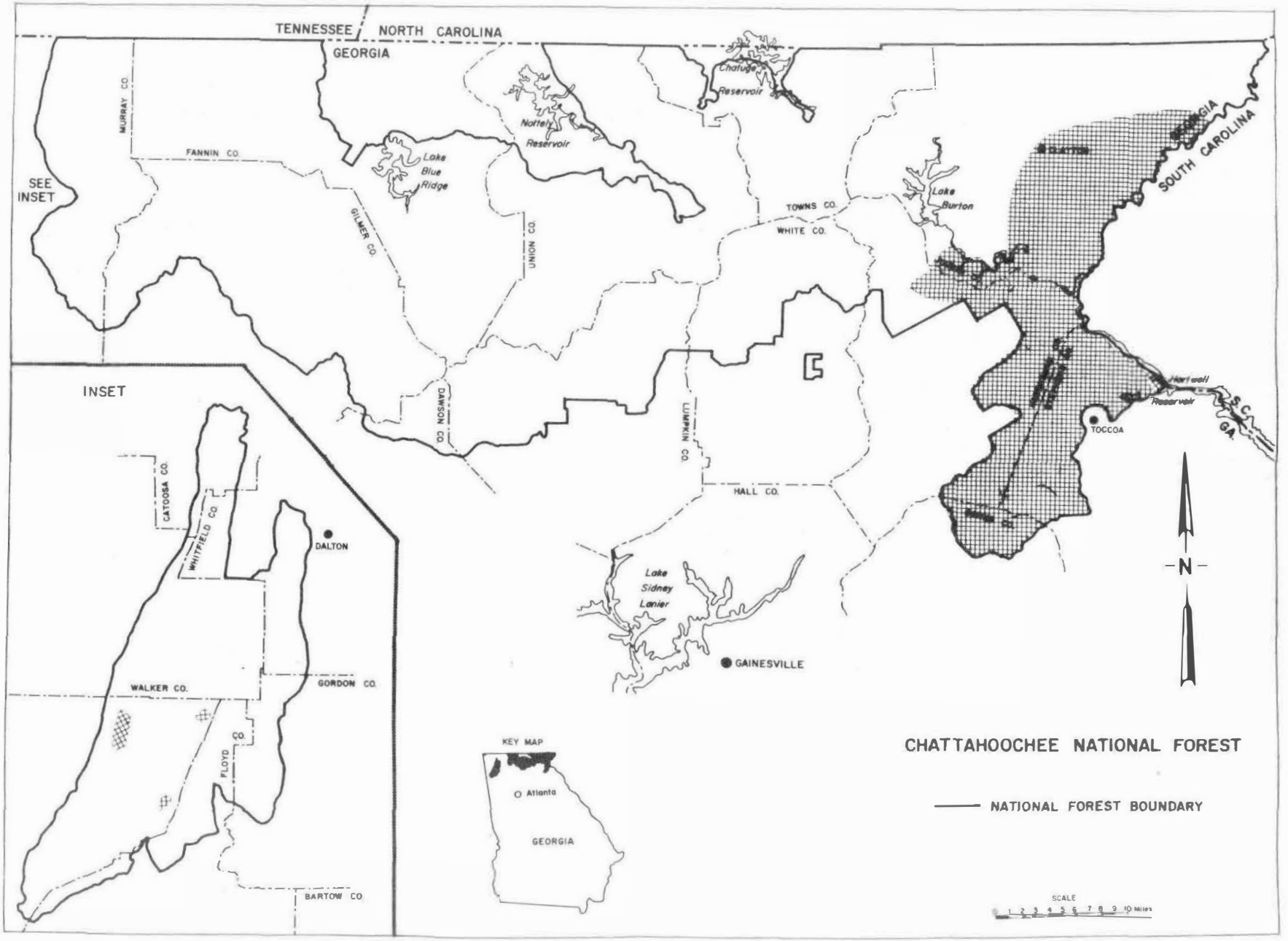

Figure 1.--Areas of heaviest southern pine beetle activity -- Chattahoochee National Forest, January 1980.

METHODS

Aerial sketch map surveys of all Chattahoochee National Forest Districts were made by personnel of the Aerial Survey Team, Forest Insect and Disease Management, Doraville, Georgia, (Bassett, 1980; Hammond, 1980). Table 1 shows dates of aerial surveys, forested acreage by infested Districts, acreage of susceptible host type by infested District and percent of aerial survey made. Sketch maps were forwarded to the Asheville Field Office, State and Private Forestry, Forest Insect and Disease Management. Spots were stratified by size class and random spot selections for ground checking were made proportionate to size class distributions.

Data collected at each infestation included the number of currently infested trees by color class, the number of red and green trees, and volume data. Data were compiled by District and finally for the entire National Forest.

RESULTS

Of all Districts surveyed, Armuchee, Brasstown, Chattooga, Chestatee, Cohutta, Tallulah and Toccoa, only three, Armuchee, Tallulah and Chattooga, showed areas of dying pine. Table 2 shows expanded results of the aerial survey by spot size category. Data from the three aerial surveys were expanded to 100 percent.

Table 3 shows results of ground checks showing number of spots and trees by size class, average number of trees per spot, number of trees per 1,000 acres of host type and percent of recently killed trees infested at the time of ground check. Aerial and ground data indicated that a total of 6,016 trees containing a volume of 884,773 bd. ft. are currently infested on the three Districts.

The following is a synopsis by Ranger Districts.

Tallulah: While the number of trees per spot and number of spots per 1,000 acres of host type are low, a very large percentage of recently killed trees are currently infested. Further, these infestations are widely distributed over the District. Therefore, a high potential is present for increased activity this spring and summer.

Chattooga: Overall, conditions here are almost identical to those on the adjacent Tallulah Ranger District.

Table 1.--Chattahoochee National Forest Districts, dates aerially surveyed, size of susceptible acreage and percent aerial survey coverage.

District	Date Surveyed	Total Acreage Surveyed	Susceptible Acreage	Type Survey	Percent Coverage
Tallulah	10/2/79	248,383	108,831	Sketch map	50
Chattooga	10/2/79	214,859	121,583	Sketch map	50
Armuchee	12/4/79	63,000	24,885	Sketch map	75
Totals for Infested Districts		526,242	255,299		

Table 2.--Spot size distribution on Chattahoochee National Forest, Georgia--expanded and corrected aerial survey data.

District	No. Spots by Size Class -------- 2-5	6-20	21-50	50+	Totals	No. Spots/1000 Acres Host Type
Tallulah	26	16	1	0	43	0.35
Chattooga	20	15	4	2	41	0.38
Armuchee	1	1	1	5	11	0.44

Table 3.--Ground truth data from southern pine beetle infestations on Chattahoochee National Forest, Georgia.

District	----- Spot Size Distribution ----- 2-5 Spots	2-5 Trees	6-20 Spots	6-20 Trees	21-50 Spots	21-50 Trees	50-100 Spots	50-100 Trees	$\bar{x}$ Trees Per Spot	No. trees per 1000 acres host type	Percent of trees infested at ground check
Tallulah	1	5	1	9	1	30	--	--	8.6	3.06	88.8
Chattooga	2	4	2	37	1	50	--	--	19.4	4.17	86.3
Armuchee	1	10	--	--	1	28	3	217	43.6	28.10	16.0
Totals for Three Infested Districts	4	19	3	48	3	108	3	217	30.1	6.04	50.2

Armuchee: This westernmost District has a small percentage of currently infested trees, but contains some relatively large spots ($\bar{x}$ = 44 trees). Most activity is in the southern part of the District. Here a potential for increased beetle activity exists this spring and summer.

CURRENT SUPPRESSION PROCEDURES

1. Removal of Infested Trees by Commercial Sale or Administrative Use. When infested trees of merchantable size are accessible, they should be removed by commercial sale or administrative use procedures. Logging of the infested material should begin immediately. Contract time limits should insure rapid removal.

   When practical, and if host type is present, a 40- to 70-foot buffer strip should be marked and cut adjacent to and ahead of the most recently infested trees. This practice is effective in reducing the possibility of "breakouts." When only a small volume of infested merchantable material occurs in a spot, noninfested trees surrounding the spot may be marked to provide an operable cut.

   The order of priority of removing beetle infested timber from a spot should be as follows:

   -- Trees in the buffer zone at the head(s) of the spot - if not removed within 2 weeks of marking, another visit and talley must be made in order to insure removal of all infested trees and an adequate buffer strip.

   -- Trees with fresh attacks and having young broods (usually the green, recently infested trees).

   -- Trees having nearly developed broods (usually the red and fading trees).

   Remove infested trees from National Forest lands by commercial sale or administrative procedures in accordance with guidelines and procedures set forth in FSM 2400 through 2490.

2. Piling and Burning. Unmerchantable or inaccessible southern pine beetle infestations can be suppressed by cutting, piling, and thoroughly burn-

ing the bark of infested trees. The entire bark surface must be thoroughly burned to insure effective control. The side order of priority for cutting, piling, and burning infested trees, particularly the large spots, is the same as paragraph (1) under "Removal of Infested Trees by Commercial Sale or Administrative Use." Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts," every effort should be made to locate and treat all green infested trees during the piling and burning operation.

3. Chemical Control. Chemical formulations recommended for southern pine beetle control is a ½ percent lindane spray with water as the carrier. This may be formulated from a 20 percent lindane emulsifiable concentrate at the rate of 11 pints of concentrate in enough water to make 55 gallons of spray. (Ratio of one part 20 percent lindane EC to 39 parts water.)

Dursban®(chlorpyrifos) is also registered for southern pine beetle control. It is available as a liquid containing 4 pounds of insecticide per gallon of concentrate. The spray is prepared by mixing 2 2/3 fluid ounces of concentrate with water to make 1 gallon or 2.1 gallons of concentrate in 100 gallons of water. Dursban® is to be applied only by or under the supervision of a certified pest control operator or other trained personnel responsible for insect control programs.

Cut, limb, and buck all infested trees into workable lengths. Spray the infested bark surface to the point of runoff. A compressed air sprayer (3-gallon capacity or equivalent) is an ideal applicator. Infested logs must be turned two or three times to insure complete treatment of infested bark. Spray stumps and bark removed by woodpeckers. Low pressure sprayers may be used to treat large accessible infestations.

The order of priority for cutting and spraying infested trees in large spots is the same as paragraph (1) under "Removal of infested Trees by Commercial Sale or Administrative Use." Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts," every effort should be made to locate and treat all green infested trees during the chemical control operation.

Never spray trees from which southern pine beetle brood has emerged. Natural enemies of the southern pine beetle in these trees can then complete their development. To prevent aerial spotters from mapping treated spots, cut trees with red needles from which beetles have emerged.

Instructions for minimizing the adverse effects of mixing, transporting and storing pesticides, applying pesticides and disposing of pesti-

cide containers and excess chemicals are outlined in Section 8.3 of the Forest Service Health and Safety Code FSM 5242.21.

4. Cut-and-leave. This control tactic reduced losses from spot growth and proliferation during the summer months. Cut-and-leave is designed to disrupt spot growth in small to medium-sized spots (40 active trees) by dispersing emerging beetles. These spots can be salvaged when markets or weather permit. Trees are still suitable for sale months after felling.

   The following procedure is to be followed when using cut-and-leave:

   (1) Identify all active trees within the spot.

   (2) Fell all active trees within the spot.

   (3) Fell a horseshoe-shaped buffer of green, uninfested trees around the most recently attacked trees at the head of the spot and leave them lying on the ground with crowns pointed toward the center of the spot. The buffer should be as wide as the average height of the trees in the stand.

   Cut-and-leave treatments should only be applied during the summer months between June and October. Spots with 10 or more infested trees should be treated first. As time permits, spots with 10 infested trees should also be treated if they contain trees with fresh attacks. In these smaller infestations where a specific head is not distinguishable, an adequate buffer strip (equivalent to the average height of the stand) and all infested and green uninfested trees within the spot should be felled.

   Reexamination of Treated Areas. Reexamine areas where infested trees were removed by commercial sales, piled and burned, or chemically treated or cut and left within 2 or 3 weeks after treatment to check for additional infested trees. If additional trees are found, treat them.

   In any area where infested trees are cut for chemical control or piling and burning or removed through commercial sales and administrative use procedures, stumps adjacent to living pine trees should be treated to control or prevent the root rot Fomes annosus.

   Stands that have been previously thinned or have had a history of F. annosus infection, stumps should be treated with the competing fungus, Peniophora gigantea.

   Stands that have no history of F. annosus and have never been thinned, the stumps should be treated with borax.

Southern pine beetle infested tree stumps cut during the period of May through August, and below 34° N. latitude do not have to be treated with either of the above materials. This is because few spores are formed during this period and high temperatures often kill spores that are produced. However, routine summer thinning in areas of southern pine beetle buildup is not recommended.

PREVENTIVE MEASURES

The preceeding represents only short-term, immediate control strategies. Preventive measures must be taken to help ward off further southern pine beetle infestations in noninfested stands. Some of the more significant preventive measures include:

1. Preventing or minimizing littleleaf disease, a condition which predisposes these weakened trees to beetle attack. Depending on severity of infection, diseased trees may be removed during normal thinnings, on a 6-year cutting cycle or as soon as merchantable. In high-hazard areas or in replanting known littleleaf sites, use loblolly pine or a more resistant tree species, as opposed to shortleaf pine.

2. Harvesting mature and overmature stands. Such stands are vulnerable to beetle attack and should be harvested as soon as possible.

3. Thinning stagnated stands. Overstocked stands are low in vigor and are more likely to be attacked. They should be thinned to a point that trees again show thrift and vigor.

4. Minimizing impact of natural disturbances which causes stand stress. These factors include ice, wind, hail, and animal damage, flooding, erosion, poor soil fertility, etc. Corrective measures include removal of individually damaged trees, wholesale salvage, improving drainage, fertilization, etc.

5. Minimizing or eliminating man-caused distrubances. Logging, pipeline, sewerline, and powerline construction, and other construction activities require use of heavy equipment which causes tree skinning and soil compaction and significantly weakens trees. Efforts to minimize the damaging consequences of these activities can significantly reduce the possibility of their leading to southern pine beetle problems.

PRECAUTIONARY PESTICIDE USE STATEMENT

Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers under lock and key--out of reach of children and animals--away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Do not apply pesticides when there is danger of drift, when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear protective clothing and equipment if specified on the container.

If your hands become contaminated with a pesticide, do not eat or drink until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Do not clean spray equipment or dump excess spray material near ponds, streams, or wells. Because it is difficult to remove all traces of herbicides from equipment, do not use the same equipment for insecticides or fungicides that you used for herbicides.

Dispose of empty pesticide containers promptly. Have them buried at a sanitary landfill dump, or crush and bury them in a level isolated place.

NOTE: Some states have restrictions on the use of certain pesticides. Check your state and local regulations. Also, because registration of pesticides are under constant review by the U.S. Department of Agriculture, consult your county agricultural agent or state extension specialist to be sure the intended use is still registered.

LITERATURE CITED

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